FAA-E-2217
AMENDMENT-4

October 30, 1970
SUPERSEDING
AMENDMENT-3, 1/5/68
& SPEC. CH. 2, 1/28/69

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION SPECIFICATION

2400 BIT-PER-SECOND DATA SET EQUIPMENT

SUPERSEDING DIGITAL DATA COMMUNICATIONS SYSTEM (DACOM)

This amendment forms a part of FAA-E-2217, dated September 15, 1965. References with a number sign (#) placed in the left-hand and right-hand margins identify the beginning and end of new or revised material which was not incorporated in prior amendments or specification changes.

Title Page. - Delete "DIGITAL DATA COMMUNICATIONS SYSTEM" and substitute "2400 Bit-per-Second Data Set Equipment."

Page 1, paragraph 1-1.1: In second line, delete "Digital Data Communications System (DACOM)" and substitute "2400 b/s Data Set." In fifth line, delete: "... of the DACOM ...".

Page 1, paragraph 1-1.2: Delete the terms "Simplex DACOM" and "Duplex DACOM" and replace with the following designations for terminal equipment types:

"Type I, Radar Remoting Data Set (RRDS) Transmitter Terminal
"Type II, Radar Remoting Data Set (RRDS) Receiver Terminal
"Type III, Interfacility Data Set (IFDS) Transceiver Terminal"

Throughout the specification, delete all references to the term "DACOM" and substitute the term: "Data Set."

Page 1, paragraph 1-2.1: Delete "CAA-R-163; Relay Racks, Cabinet types" and substitute "FAA-E-163; Rack, Cabinet and Open Frame Types." Delete "FAA-R-777 Electronic Equipment, General Specification" and substitute:

"FAA-G-2100/1 Electronic Equipment, General Requirements; Part 1, General Requirements for all Equipments

"FAA-G-2100/3 Part 3, Requirements for Equipment Employing Semiconductor Devices

"FAA-G-2100/4 Part 4, Requirements for Equipment Employing Printed Wiring Techniques"

Throughout the Specification, delete the following references to Specification FAA-R-777 and substitute:

Page	Paragraph	Delete	Substitute
15	1-3.4.5	"FAA-R-777"	"1-3.4.4 of FAA-G-2100/1, and finished in accordance with FAA-G-2100/1, 1-3.8"
20	1-3.4.5.7	Delete Paragraph	"Unused"
21	1-3.4.5.8	"FAA-R-777 paragraph 3.23"	"FAA-G-2100/1, 1-3.13"
21	1-3.4.5.8	"3.23.1 & 3.23.3 of FAA-R-777	"1-3.13.2.1 & 1-3.13.2 of FAA-G-2100/1"
21	1-3.4.5.8.1	"FAA-R-777 paragraph 3.23.3"	"FAA-G-2100/1, 1-3.13.2"
21	1-3.4.5.8.1	"FAA-R-777 paragraph 3.23"	"FAA-G-2100/1, 1-3.13"
21	1-3.4.5.10	"FAA-R-777 paragraph 3.14"	"FAA-G-2100/1, 1-3.8"
21	1-3.4.5.10	Delete the last sentence	(see above)
22	1-3.4.5.11	"FAA-R-777 paragraph 3.21"	"FAA-G-2100/1, 1-3.12"
23	1-3.7	"FAA-R-777"	"FAA-G-2100"

Page	Paragraph	Delete	Substitute
35	1-4.1	"Section 4 of Specification FAA-R-777"	"Section 1-4 of FAA-G-2100/1"
36	1-4.3.1	"Paragraph 4.9 of FAA-R-777	"Paragraph 1-4.3.3.2 of FAA-G-2100/1"
38	Table III Test No. 23	"FAA-R-777, paragraph 4.10"	FAA-G-2100/1, 1-4.3.2.1 and 1-4.3.2.2"

Page 2, paragraph 1-2.2: Delete MIL-C-62, MIL-C-26655, MIL-R-26474, and MIL-STD-829 entries in their entirety and add the following:

"MIL-HDBK-217A	Reliability Stress and Failure Rate Data for Electronic Equipment
MIL-STD-471	Maintainability Demonstration
MIL-STD-756A	Reliability Prediction
# MIL-STD-721B	Definitions of Effectiveness, Terms for Reliability, Maintainability, Human Factors and Safety
MIL-STD-781B	Reliability Tests: Exponential Distribution
MIL-STD-785A	Reliability Program for Systems and Equipment, Development and Production
MIL-E-17555	Electronic and Electrical Equipment and Associated Spare Parts, Preparation for Delivery of. #

Page 2, paragraph 1-2.3: Delete Tariff FCC No. 237 entry in its entirety and substitute:

"Tariff F.C.C. No. 260 Private Line Service"

Page 3, Table I: Delete Table I entirely and substitute the following:

"Table I
Data Terminal Equipment

Equipment Description	Quantity Per Set: Type I Terminal	Type II Terminal	Type III Terminal	Specification Paragraph
Power supply assembly	1	1	1	1-3.11
Power supply module	2	2	2	1-3.11.1
Transmitter clock module	3 or 4*	0	2	2-3.3.3
Receiver clock module	0	3	2	3-3.3.3
Data transmitter assembly	3 or 4*	0	2	2-3.3
Data receiver assembly	0	3	2	3-3.3
Interconnection jack panel	1	1/rack	1/rack	1-3.10
Patch cards	1 set	1 set/rack	1 set/rack	1-3.10
Equipment cabinets (racks)	1	Note 1	Note 1	1-3.4.1
Wiring harness	1 set	1 set/rack	1 set/rack	1-3.9
Terminal block and connectors	1 set	1 set/rack	1 set/rack	1-3.4.1.2
Auxillary test cables	1 set	1 set/rack	1 set/rack	1-3.4.5.4.1
Blank panels	----------as required---------			1-3.4.5
Spare modules	1 set	Note 2	Note 2	1-3.4.5.2.1
Service extension units	1 set	1 set	1 set	1-3.4.5.4.2
M/S plug-in modules (option)	----------See Note 3----------			1-3.3
Class "b"&"c" modules (option)	Note 4	0	0	1-3.3.1.1.2
Instruction book	2	2	2	FAA-D-638

* Type I class "b" and "c" terminals (for dual and triple remoting respectively) shall be delivered with 4 transmitter assemblies installed.

Note 1: Equipment cabinets for Type II and III terminals shall be delivered in the quantities and to the locations as called out in the contract schedule. All cabinets shall be wired to accommodate 12 assemblies (receivers, transmitters or mixture); however, the cabinets shall be delivered equipped only with the terminal quantities specified, by location in the contract schedule. Type III terminals ordered for ARTS-111 locations, shall be delivered less cabinets.

Note 2: Two sets of spare modules shall be sent to each location receiving Type II or Type III terminals.

Note 3: Optional plug-in modules for main and standby operation of transmitter assemblies within Type I (class "a", "b" and "c"), Type II, and Type III terminals shall be delivered installed in the assembly and in the quantities, by location, as specified in the contract schedule."

Note 4: Optional plug-in transmitter modules and associated rack and jack panel wiring shall be supplied installed for Type Ib dual remoting terminals and Type Ic triple remoting terminals in the quantities called out in the contract schedule.

Page 5, paragraph 1-3.2.1: Delete and substitute "Unused."

Page 5, paragraph 1-3.2.2: Delete and substitute "Unused." Throughout the specification, wherever the term "normal operating conditions" appears, delete and substitute the term "normal test conditions."

Page 5, paragraph 1-3.2.3: Delete and substitute the following:

"1-3.2.3 Service conditions. - The 'service conditions' set forth below define the conditions under any practical combination of operational environment during which all specification requirements for data sets shall be met without readjustment of any equipment controls.

(a) The ambient conditions shall be as follows (1-3.2.23, FAA-G-2100/1):

For terminal equipment at radar sites: Environment II, except that the minimum temperature shall be 0° C instead of -10° C, and under test conditions calling for maximum relative humidity, the relative humidity shall be at least 90%, but at the option of the contractor, it may be any value in the range 90% to 100%; however, all specification requirements shall be met at the relative humidity values within this range which the contractor provides in conducting the tests.

For terminal equipment at ARTCC sites: Environment I

(b) Other parameters shall be as follows, modifying requirements of 1-3.2.23 of FAA-G-2100/1:

AC Line Voltage	
(120 V)	108 V to 132 V
AC line frequency (60 Hz)	59 Hz to 61 Hz
Elevation	0 to 12,000 feet MSL
Storage	-30° C to 71° C

Throughout the specification, delete all reference to modulation rates of 600 BPS and 1200 BPS.

Page 6, paragraph 1-3.2.5: Add the following sentences:

"Up to 6 type II terminals may be installed in one cabinet. Likewise, 3 Type III terminals may be installed in one cabinet. Only one Type I terminal is installed in a cabinet."

Page 8, paragraph 1-3.2.14: Delete the second and third sentences and substitute:

"The 'Series 3002' communications channels refer to the common carrier private line service for data transmission provided in Tariff F.C.C. No. 260, or the equivalent. Characteristics of Series 3002 data communications channels referenced in this specification are defined below. Note: The tariff does not include all of the characteristics specified below." Throughout the Specification, whenever the term "Schedule 4" appears, delete and substitute the term "Series 3002." The limits for "(S+N)/N" are incorrectly stated. Delete "... 26 DBRNC" and substitute: "... 26dB, C message weighting."

Page 9, paragraph 1-3.3: Add the following paragraph:

"Critical Government data communications circuits will include both main and standby channels which, when employed, will be geographically diverse dual-routed between remote sites in either the Type I - II Radar Remoting Data System (RRDS) or Type III - III Interfacility Data System (IFDS). For such circuits the Government will order transmitter and receiver assemblies with a main and standby channel configuration. With this configuration, data shall be transmitted simultaneously over the main and standby data channels and the receivers shall be able to automatically switch to the standby channel if the main fails. The quantity of terminals to be so equipped shall be as called out in the contract schedule. The equipment design shall provide the functions specified and performance requirements shall be met when the system is configured for main-channel only operation or for main and standby-channel operation. System reliability and maintainability (1-3.6) and system performance requirements (1-3.14) shall remain the same regardless of transmitter output and receiver input channel configurations. When plug-in module sets are provided after equipment delivery, it shall not be necessary to perform equipment modifications, other than strap options to implement a main-standby equipment configuration."

Page 9, paragraph 1-3-3.1: Delete the paragraph and substitute the following:

"1-3.3.1 Simplex Radar Remoting (RR) Operation (RADAR/ARTCC Sites)

A simplex data transfer system is shown in Figure 1 and shall be provided using Type I and Type II terminals. Equipment will be installed by the Government at radar sites and ARTCC's for medium-speed transfer of digitized search radar, beacon, and weather contour data to a NAS Central Computer Complex (CCC). RRDS Type I and Type II terminals will normally be interconnected by three full period, one-way 3002-C1 communication channels. In cases where the main/standby channel (M/S) option is exercised six 3002-C1 communication channels will interconnect the Type I and Type II terminals. It shall be noted that Figure 1 shows only one of four type II terminals that may be housed in a Type II equipment cabinet. The specific packaging of Type II terminals per rack per location shall be as specified in the contract schedule."

Page 9, paragraph 1-3.3.1.1: Delete the paragraph text and substitute the following: "Serial binary data from interfacing external equipment will be transferred to each RRDS transmitter. After encoding and modulating the data, each RRDS transmitter shall send digital information over a 3002-C1 data communication circuit to a remote ARTCC. When the M/S option is specified in the contract schedule, the M/S quantity order shall be delivered with the necessary plug-in module or modules as required to allow simultaneous transmission of digital data over two 3002-C1 data channels or equivalent (i.e., FAA owned microwave link, RML, 4 KHz voice channel).

In some instances the Government will have one radar site remoting data to two or three ARTCCs. To facilitate such modes of operation the Type I terminal shall be available in three classes, "a", "b" and "c", to accommodate single, dual and triple remoting, respectively. The quantity of each class of Type I terminal will be specified in the contract schedule. The design of the Type I terminals shall be such that expansion of the basic class "a" transmitter to a class "b" or "c" transmitter, with or without the M/S option, can be effected through the addition of plug-in output modules and limited strap changes. The following table presents the three classes of Type I terminal, showing the number of output circuit drivers required with and without the M/S option.

	Output Circuit Drivers	
Class	Without M/S Option	With M/S Option
Ia	3	6
Ib	6	12
Ic	9	18"

Page 10, Fig. 1: Page 13, Fig. 2: In Figure 2, delete the standby designations on Transmitter B and Receiver B. At the input to each receiver and output of each transmitter, include an additional circuit from the jack panel. Similarly, at the output of each receiver, add an additional circuit to the

jack panel. The 3 or 4 additional, 6 additional and 6 additional circuits for Type I, II and III terminals, respectively, are required when operating with a standby channel output from each transmitter and standby channel input and parity input to each receiver. In cases where class "b" and "c" Type I terminals are specified each RRDS transmitter shall show 2 or 4, or 3 or 6 output circuit as appropriate for the M/S option specified.

Page 11, paragraph 1-3.3.1.1.2: Delete the paragraph entirely and substitute the following:

"1-3.3.1.1.2 Optional class "b" and "c" Type I terminals: When specified in the contract schedule the stated quantities of Type Ib and Type Ic terminals shall be delivered with 4 transmitter assemblies and modules for six (6) and nine (9) output circuit operation respectively (12 and 18 output circuit capability if the M/S option is also specified). When the Type Ib terminal is to be delivered, the associated interconnection jack panel and cabinet shall be wired to accommodate the six (6) output circuits (or 12 if the main/standby option is specified). Likewise, Type Ic terminals shall be delivered with the cabinet and interconnection patch panel wired to accommodate nine (9) output circuits (18 if the M/S option is specified)."

Page 11, paragraph 1-3.3.1.1.4: In line 3, delete the phrase ..."either a 3-channel or".... In line 4 change ..."4-channel system"... to read ..."a 4-transmitter terminal".... In line 5 change ..."a 3-channel"... to read ..."a 3-transmitter".... Delete the last sentence and substitute the following: "In a 4-transmitter terminal, when a failure occurs in one of the on-line transmitters, the forth transmitter will be manually patched to pick up the load of the failed unit." #

Page 11, paragraph 1-3.3.1.1.5: Delete the last sentence and substitute:

"A standard telephone instrument with alternate voice-date provisions shall be used at each terminal of a system to permit rapid access and interface with 2-wire switching systems of the common carrier having a central office impedance of either nominally 600 ohms or 900 ohms, referenced to 1000 CPS. The local loop communications channel interconnecting the central office with the I/O data channels of the terminal equipment via selective patching at the jack panel shall be a 2-wire balanced circuit with microphone battery being applied continuously to the closed loop during digital transmissions. Over the frequency spectrum for principal digital signals, circuitry shall be provided in the terminal equipment to present an impedance to the local loop of either 600 ohms ± 10%, or 900 ohms ± 10% for DC loop currents up to 0.1 ampere maximum. Impedance transformation to permit operation with either 600 or 900 ohms 2-wire systems shall be provided by a simple wiring change in the equipment. Equipment shall be delivered with wiring strapped for operation with a 900 ohm system. The telephone instrument is not an item of equipment to be delivered on the contract schedule."

Page 12, paragraph 1-3.3.1.2: Add the following sentences: Each RRDS receiver shall have a dual V.F. input circuit capability that can be easily effected through addition of appropriate filter/PC board modules and minimal strapping. In addition, the RRDS receivers shall contain a switch circuit that operates on parity information coming from the FAA's Common Digitizer Data Receiver Group (DRG) equipment. In the event the parity errors exceeds a preset rate, the receiver shall switch to the standby channel.

Page 12, paragraph 1-3.3.1.2.2: Delete the paragraph.

Page 12, paragraph 1-3.3.1.2.3: Add the following sentence: "The Type II terminal rack wiring shall be configured so the terminal dual power supply powers the 3 receivers of the RRDS receiver terminal."

Page 12, paragraph 1-3.3.1.2.4: Change the second and third lines to read: "... provided to permit manual selective patching of the receiver assembly I/O data for main and standby channels, clock signals, and parity alarm circuit to permit circuit flexibility equal to the functional requirements as stated in 1-3.3.1.1.4 and 1-3.3.1.1.5.

Page 12, paragraph 1-3.3.2: Delete the text and substitute the following: "A duplex data transfer terminal is shown in Figure 2. The equipment will be installed by the Government at ARTCCs for medium speed interchange of data between digital computers at centers. Duplex system operation shall be provided using one transmitter/receiver pair of a Type III terminal on each end of a full duplex communication channel. When the contract schedule orders Type III terminals without the M/S option, each terminal shall be equipped to terminate two full duplex data communication channels. When the contract schedule orders the M/S option, each Type III terminal transmitter and receiver shall have installed the M/S plug modules, thus enabling the Type III terminal to terminate from (4) full duplex data communication channels. The data communication channel characteristics will be equivalent to the voice bandwidth 3002-C1 common carrier data channel. Serial binary I/O data to and from external equipment, shall be simultaneously transmitted and received on separate simplex data channels connecting to the corresponding terminal assemblies. A Type III terminal configuration shall be such that a Type III terminal cabinet rack can contain up to three (3) complete Type III terminals.

Page 14, add the following paragraphs after 1-3.3.2.2:

"1-3.3.3 - ARTS III Terminal Operation: Communication between ARTCCs and the Automated Radar Terminal Systems (ARTS III) will be via a full duplex 3002 C1 data circuit. The ARTCC end of the data circuit shall terminate into one transmitter and receiver pair of a Type III terminal. The ARTS III end of the circuit shall terminate in a modified Type III terminal consisting of one power supply assembly, one transmitter assembly, one receiver assembly, and one signal and power distribution assembly. Hereafter the modified Type III terminal for ARTS III facilities shall be referred to as the ARTS III terminal.

1-3.3.3.1 Clock module - Seperate plug-in type clock modules shall be furnished with each transmitter and each receiver assembly and shall be interchangeable with clock modules furnished in Type I, Type II and Type III terminals.

1-3.3.3.2 Signal and power distribution (SPD) assembly - One signal and power distribution assembly shall be furnished as part of each ARTS III terminal and shall serve as the connection point for all circuits external to the terminal. The assembly shall require not more than one "B" panel of vertical rack spare and shall be capable of mounting in a FAA-E-1636, Type I cabinet rack. The assembly shall contain a terminal strip area for connection of V.F., alarm, and AC power circuits, that is accessable from the back of a cabinet rack. Likewise, suitable BNC connector for data and clock signals shall be equally accessable and preferably in the vicinity of the terminal strip area. The assembly shall contain RFI filters for the AC circuit going to the power supply assembly. On the front, or at least accessable from the front of each SPD assembly shall be six phone jacks and four BNC jacks. The six phone jacks shall provide line, monitor and equipment connections for the transmitter assembly and receiver assembly. The four BNC jacks shall provide clock and data monitoring function for the transmitter assembly and receiver assembly. All jacks shall be clearly marked to indicate function."

Page 14, paragraph 1-3.4.1: Delete the text and substitute the following:

"All RRDS transmitter terminal (Type I) equipment shall be installed in Type I cabinet racks as described in Specification FAA-E-163, and with modification thereto as stated hereunder. All RRDS receiver terminal (Type II) and IFDS terminal (Type III) equipment shall be installed in Type III cabinet racks as described in Specification FAA-E-163 and with modifications thereto as stated hereunder. Side squares duct openings with cover plates shall be installed on all cabinets. There shall be no external projection on cabinet side panels such as bolt heads or fasteners that would prevent flush mounting and bolting together of adjacent cabinets. All cabinet racks furnished shall be 25 1/2" $\pm$ 1/16" in depth in lieu of 22" $\pm$ 1/16" as specified in FAA-E-163. AC power wiring shall enter the rack via an appropriate size conduit coupling near the left rear (when viewed from rear of rack) top corner of the rack. Signal wires will be entering the cabinet via either of the two 4" x 4" cutouts in the cabinet top. All cabinets shall be finished in accordance with FAA-G-2100/1b, paragraph 1-3.8.

Page 14, paragraph 1-3.4.1.1 - In the second sentence, fourth line, delete ..."CAA-R-163"... and substitute ..."FAA-E-163".... Near the end of the third sentence, line 6, delete ..."Size I"... and substitute ..."Type I"....

Page 14 & 15, paragraph 1-3.4.1.2: On line 3, after "data", add "parity signals." In line 6, delete "...lower left rear wall..." and substitute

"...top inside...". Add the following to the paragraph: "A separate primary power circuit shall be provided to the rack convenience outlets, the blower motors and each power supply assembly and each circuit shall be terminated separately on the terminal block. One additional AC power circuit shall be provided in all Type I terminals. All AC power circuits going to the data set power supplies shall have RFI filters installed to prevent data set interference from entering the AC system and also to prevent AC circuit noise from entering the data set power supply. The AC circuits for the convenience outlets and blower motors need not be filtered provided they are contained in a ferrous enclosure effectively isolating the circuits from the data terminal wiring harness. All AC filters and terminal boards shall be serviceable either via the rear door of the rack or via removal of blank panels from the front of the rack.

Page 15, paragraph 1-3.4.5: Delete the second sentence and substitute: "To achieve optimum equipment design and minimize space requirements for installation, it is the Government's desire to procure equipment with integrated circuitry used to the maximum extent practicable." Add the # following at the end of the paragraph: "In the Type I terminal, an unused front panel height of 14 inches will be allocated for installation of Government-installed equipment. The power consumption of the added Government equipment will not exceed 100 watts. Accordingly, in the Type I terminal, a 14-inch front panel height shall be open without blank panels."

Page 17, paragraph 1-3.4.5.1: Delete and substitute:

"1-3.4.5.1 Packaging and construction - The basic concept of equipment packaging shall be modular. Configuration of terminal assemblies shall be based on one of the following construction options to be selected by the Contractor. In a specific type of terminal, only one of the options shall be used. Each terminal assembly shall be designed for mounting in a standard relay rack with a front panel in accordance with 1-3.4.4 and a 1-3.4.4.1 of FAA-G-2100/1. Assembly structure shall permit suitable cooling of components without special devices being mounted in position on the # equipment assemblies."

(a) Standard relay rack mounting assembly with front panel/chassis configuration that is mounted on slideout drawers. Drawer slides shall be heavy-duty lock type that permit securing the assembly either in the normal or extended position. In the extended position, slides shall permit pivoting the assembly through $\pm$ 90° from the horizontal position. All printed circuit (PC) plug-in modules shall be mounted vertically in PC card racks.

(b) Standard relay rack mounting assembly with front panel/chassis configuration in accordance with Drawing D-21342H, Method 1. Access to all PC plug-in modules shall be provided with the door panel in the extended

position. Assemblies containing shelf-mounted plug-in modules with separate front panels that form a bookcase type of front panel assembly shall be in accordance with Drawing D-21342H, except that front panel material shall be 1/8-inch thick and supporting chassis material shall be 1/16" thick. Forming of the supporting chassis flange, as shown in the A-A detailed section of Drawing D21342H shall be such that the chassis flange is bent outward under the mounting surface of the front panel to provide additional mounting support and strength to the mechanical assembly."

Page 18, paragraph 1-3.4.5.2.1: Add the following sentence: The spare module set for each type of terminal shall include one of each electrical part composite not otherwise supplied within or as a plug-in module for the particular terminal type in question.

Page 19, paragraph 1-3.4.5.5 and subparagraphs 1-3.4.5.5.1, 1-3.4.5.5.2, and 1-3.4.5.5.3: Delete the paragraph and subparagraphs except 1-3.4.5.5.4.

Page 19, paragraph 1-3.4.5.5.4: Renumber the paragraph to 1-3.4.5.5. In line 2, delete "1-3.4.5.5.2" and substitute "MIL-STD-275." #

Page 20, paragraph 1-3.4.5.6.2: Delete the first sentence and substitute:

"Solid state integrated circuitry shall be used (modifies FAA-G-2100/3, 3-3.1) to the maximum extent practicable in accordance with the following:"

Page 20, paragraph 1-3.4.5.6.2 (b) & (e): Change to read as follows: "(b) Integrated Circuits shall be hermetically-sealed and packaged in either JEDEC No. TO-5 enclosures, flat-pack enclosures with a maximum of 14 leads or ceramic Dual In-Line (DIP) packages." (e) Either vendor or military reliability figures are acceptable for use in computing mean time between failures (MTBF); and"

Page 21, paragraph 1-3.4.5.8: Delete the following items from the tabulation:

"DIGITAL DATA TRANSMITTER TERMINAL (TYPE I)

DIGITAL DATA RECEIVER TERMINAL (TYPE II)

DUPLEX DIGITAL DATA TERMINAL (TYPE III)

Interconnection Jack Panel"

Substitute the following:

"DATA TRANSMITTER CABINET - TYPE Ia
" " " " Ib
" " " " Ic

DATA RECEIVER CABINET (TYPE II)

DUPLEX DATA TERMINAL CABINET (TYPE III)"

In the third line of the note, change ..."I, II, and III"... to read ..."II and III"....

Page 22, delete paragraph 1-3.4.5.12 entirely and substitute the following:

"1-3.4.5.12 Main-standby channel receiver circuit isolation - Power circuits to the main and standby channels, where feasible, shall be isolated by circuit decoupling. Fuses shall not be used. This requirement is imposed to assure that system MTBF requirements (1-3.6) can be achieved. For purposes of estimating system failure rates, redundant circuits for main and standby channels shall be considered in parallel. Whether or not the standby channels modules are not installed, the requirements of 1-3.6 shall remain unchanged."

Page 22, paragraph 1-3.4.5.13: Delete the text in its entirety and substitute the following: "To assure compatability with the Systems Maintenance Monitor Console (SMMC) and other equipment, this paragraph and subparagraphs hereunder define status and alarm circuits required in each transmitter, receiver, and power supply assembly which shall be extended to terminal strips at the top inside of the cabinet (1-3.4.1.2) for connection to external monitoring equipment. These terminals are hereafter referred to as the external circuit interface (ECI).

"Individual power supply module alarm circuits (1-3.11.3) shall be series-connected to provide a single ECI alarm for each power supply assembly.

"The transmitter data output monitor, clock output monitor, power input monitor (2-3.3.9.1) and the TEST position of the test pattern switch (2-3.3.8.1) shall be logically OR'ed as a single ECI alarm function for each transmitter assembly.

"The status and alarm circuit monitors in each receiver assembly (3-3.3.8) shall be grouped into five (5) separate ECI alarms as follows:

(a) Automatic/Manual mode select (3-3.3.2.1 a)

(b) Main in-use/Standby in-use (3-3.3.2.1 a)

(c) VF input signal monitor (3-3.3.8.1), Main OR Standby channel

(d) Parity alarm monitor (3-3.3.8.3), Main OR Standby channel

(e) Clock output signal monitor (3-3.3.8.2) OR Power Input Monitor OR TEST position of the test/normal switch (3-3.3.8.4)"

Add the following subparagraphs:

"1-3.4.5.13.1 Status and alarm circuit interface - All ECI status and alarm circuits for each type of terminal shall have the following characteristics:

(a)	Impedance:	100 ohms maximum (resistive)
(b)	Logic levels and state:	Alarm OFF, Normal, Main in-use, or automatic mode: Positive 6 ± 1 volts (ONE state); Drive capability of 10 ma. Alarm ON, Standby in-use, Test or Manual mode: No greater than ± 0.5 volts (ZERO state); sink capability of 100 ma.
(c)	Short circuit current:	Shorting of ECI terminals shall not cause a current flow exceeding 100 ma.

The above levels are referenced to signal ground (1-3.8.1)."

Page 22, add the following paragraph after 1-3.4.5.13.1:

"1-3.4.5.14 Terminal equipment configuration - Within 120 calendar days from the date of contract, the contractor shall submit to the Contracting Officer, for review, a configuration data package which describes, in detail, the terminal equipment configuration. These data shall include the design, physical and functional description of the system. As a minimum, the following shall be included:

(a) Physical layouts of cabinets, front panels and plug-in modules.

(b) Functional description of each system and individual assemblies with supporting block diagrams, logic diagrams, and schematic diagrams.

(c) System adjustment and operation.

(d) Results of reliability and maintainability studies and analysis which support system requirements (1-3.6). Reliability analysis and predictions shall be performed in accordance with the procedures and criteria contained in MIL-STD-756 and MIL-HDBK-217. Terms and definitions for reliability and maintainability shall be in accordance with paragraph 1-4.3.6.1.1 and MIL-STD-778.

Within 15 calendar days after receipt of the contractor's configuration data package, the Government will review the data package for compliance with

technical aspects of the Contract. Any applicable comments provided by the Government shall be included by the contractor in a revision to the data to conform with technical requirements of the contract.

Page 23, paragraph 1-3.6: Delete and substitute:

"1-3.6 System reliability and maintainability - Terminal equipment shall be designed to achieve reliability and maintainability requirements that are specified below. These requirements shall result in an on-line availability of at least 0.9985 for a simplex system (1-3.3.1) and at least 0.9990 for a duplex system (1-3.3.2), either with or without the standby channel plug-in modules (1-3.3) installed in each receiver assembly."

(a) Mean-time-between-failures (MTBF) for a 3-channel simplex system shall be at least 2000 hours and at least 3000 hours for a duplex system; and

(b) Mean-time-to-repair (MTTR) shall not exceed 15 minutes; and

(c) Mean-preventive-maintenance-time (MPMT) shall not exceed 1.0 hour in 720 hours of operation.

All electronic and mechanical equipment and components shall be designed and fabricated to minimize the skill, experience, and time necessary to assemble and maintain them. Corrective maintenance shall use a remove-and-replace philosophy with actual repair of the replaced module to be accomplished later in a separate maintenance area."

Page 24, paragraph 1-3.10: Delete the text and substitute: "Jack panels shall be provided to manually interconnect by use of patch cords all I/O data, clock and parity signal input circuits for each channel in the associated Type I, Type II, and Type III terminals. All jack panels shall be wired to accommodate the main and standby communication channel option even though the associated terminal equipment does not include the optional M/S plug-in modules. By use of patch cords, transposing of terminal assemblies with interfacing external circuits shall permit both on-line and off-line operation of assemblies during periods of system malfunction, or during test and maintenance operation. The jack panels shall consist of a six-row jack field with two each line, "monitor" and "equipment" jacks associated with each transmitter or receiver V.F. interface. The jacks shall be wired such that without patch cords the two transmitter outputs or two receiver inputs shall be connected to their assigned data circuits. When patch cords are used, the wiring of the monitor jacks shall be such that the monitor jacks

remain with the transmitter outputs or receiver inputs regardless of the cross patching between equipment and lines. In general, the left half of the jack panel shall be used for the voice frequency (V.F.) or telephone circuit lines and equipment interfaces, and the right side for data, clock and parity (receiver only) interfaces (hereinafter referred to as D.C. interfaces). As in the case of the V.F. interface jacks the D.C. interface jacks shall be wired such that without patch cords the transmitter and receivers are connected to their assigned external equipment interfaces. Likewise, the monitor jacks associated with a particular equipment shall not be removed from the transmitter or receiver circuit during a cross patch mode (patching from equipment 1 to line 3, etc.). Each patch panel shall contain an adapter circuit that transfers the tip, ring and sleeve functions of a telephone circuit jack to a pair of BNC chassis jacks. The tip and ring of the telephone jack shall go to the center conductor of the two BNCs respectively. The sleeve shall connect in common to the two BNC jack bodies or outer conductor circuit. The type of jacks used shall be of the 3-circuit telephone type and shall be the same for all circuits and terminals. Nomenclature shall be included on the front panel or printed on designation strips to identify all circuits for each type terminal. Dummy plugs shall be installed in unused locations of the jackfield. Each jack panel shall be furnished with a set of patch cords as specified hereunder. In modification of FAA-G-2100/1, paragraph 1-3.10, Tensil wire is acceptable for use in patch cords.

1-3.10.1 Type I jack panel - For a single remoting RRDS Type Ia terminal the first four jack field columns (counting from left to right) shall be assigned consecutively to transmitters 1, 2, 3 and spare. For a dual remoting RRDS Type Ib terminal the first four V.F. jack columns shall be assigned to transmitters 1, 2, 3 and spare (ARTCC #1 circuits). Jack columns 5 through 8 shall be assigned to transmitters 1, 2, 3 and spare (ARTCC #2 circuits). Accordingly for triple remoting RRDS Type Ic terminals, the first 8 columns shall be identical to a dual terminal and jack columns 9 through 12 shall be assigned to Transmitters 1, 2, 3, and spare (ARTCC #3 circuits). With each single remoting RRDS Type Ia terminal a set of four (4) patch cords shall be furnished with mating plugs (ring, tip and sleeve) installed on flexible shielded cables, approximately two feet in length. With each dual remoting RRDS Type Ib terminal a set of six (6) patch cords shall be furnished. With each triple remoting RRDS Type Ic terminal a set of eight (8) patch cords shall be furnished.

"1-3.10.2 Type II/Type III jack panels - Each jack panel shall contain a six-row jackfield with dual 3-circuit telephone-type jacks for the I/O circuits. Dual 3-circuit jacks (ring, tip and sleeve) shall be used for "line" and "equipment" interface patching. The dual 3-circuit jacks are required to preclude mis-patching of the balanced dual-input VF circuits of the three unbalanced output circuits associated with the receiver.

The left half of the jack panel shall have 12 jack columns for the V.F. interface circuits and the right half of the jack panel shall have 12 jack columns for the D.C. interface circuits. A set of five (5) patch cords shall be furnished. Two (2) cords shall have single 3-circuit mating plugs installed and three (3) cords shall be furnished with dual type-3-circuit mating plugs installed on flexible shielded cables, approximately four feet in length. The body of the twin plug shall be notched for use as a visual aid to preclude possible circuit transpositioning during patching operations. In the middle of each jack panel one jack column (e.g., #13) shall have a 600 ohm ± 10%, 10 dB±0.5dB "H" pads connected between the equipment and line jacks. The monitor jacks shall be wired to the equipment side of the "H" pad. These two jack circuits and pads shall serve as dummy line for adjusting the receiver VF alarm lines and making receiver performance checks.

Page 24, paragraph 1-3.11: Add the following: "The power supply assembly shall operate from a single phase two-wire AC line source. The design-center values for the power source (FAA-G-2100/1, 1-3.2.21) shall be 120v and 60 CPS. Each power supply assembly within a cabinet shall have separate AC power circuit terminals appearing at the cabinet terminal strip.

Page 25, paragraph 1-3.11.5: At the end of the last sentence, change the period to a comma and add: "but shall not be electrically connected across the fuse."

Page 26, paragraph 1-3.13: Change line 13 to read: "voice-bandwidth, common-carrier 2-wire switched networks (1-3.3.1.1.5) to establish the ...".

Page 32, paragraph 1-3.14.3.2: In line 2, insert: "(1-3.14.3)" after the word "rates."

Page 32, paragraph 1-3.14.5: In the second and third lines from the end of the paragraph, delete: "...all ONEs, all ZEROs, and ...".

Page 32, paragraph 1-3.15: In line 3, change "at least 40 DB" to "50 DB, or more."

Page 33, paragraph 1-3.17.1: Delete and substitute:

"1-3.17.1 System design data - Within 120 days from the date of contract, the contractor shall deliver one reproducible and then (10 copies of a system design data package. The information contained in the design data shall include complete physical and functional description of the proposed design. As a minimum, the following shall be included:

(a) System packaging design with physical layouts of cabinets, front-panels, and plug-in modules.

(b) Functional description of each system and individual assemblies with supporting block diagrams, logic diagrams, and schematic diagrams.

(c) System adjustment and operation.

(d) Copies of reliability and maintainability studies and analysis supporting the design concepts.

The Government will review these data and any subsequent revisions thereto for compliance with technical aspects of the contract. Any applicable comments provided by the Government shall be included in a revision to these data by the contractor. Formal design review meetings that are held jointly between the Government and the contractor shall be recorded by the contractor. Upon request, copies of minutes of these meetings shall be provided to the Government."

Page 34, paragraph 1-3.17.2: Delete and substitute "Unused."

Page 34, paragraph 1-3.17.4: Change the first line to read: "All factory performance tests required for regular production equipment and on-site...". Add the following after the first sentence: "The proposed test methods and test data forms (re: FAA-G-2100/1, 1-4.2) for use with prototype equipment to demonstrate compliance with this specification shall include a separate test plan for reliability/maintainability testing (1-4.3.6.1), performance tests over switched networks (1-4.3.6.2), and on-site performance tests (1-4.3.6.3). The test methods, test data forms and reliability test plan shall be submitted sufficiently in advance of the contractor's scheduled date for testing to allow the Government 60 days in which to review and evaluate (modifies FAA-G-2100/1, 1-4.2)."

Page 34, paragraph 1-3.17.6: Delete and substitute:

"1-3.17.6 Reliability program: The required reliability and maintainability shall be obtained through a reliability program performed in accordance with the following:

(a) A reliability program plan shall be submitted as a separate part of the system design data and shall include: Program orgainization with review and control procedures: Procedures to be used as manufacturing controls and quality control to assure that reliability achieved in the prototype design is maintained at the same acceptable quality level during production; Reliability analysis and design review of the system, and reliability and maintainability test plan to be used during factory demonstration of achieved MTTR, MPMT, and MTBF.

(b) System reliability analysis and predictions shall be performed in accordance with the procedures and criteria contained in MIL-STD-756A and MIL-HDBK-217A. When parts are not included in the coverage of MIL-HDBK-217A, existing available failure data or valid preductions shall be used to calculate reliability. Statistical failure tests shall not be performed by the contractor to establish component failure rates to qualify components for use in the equipment.

(c) When the predicted reliability of a system is less than the required value (1-3.6), the contractor shall accomplish such design changes as are necessary to raise the reliability to the required value.

(d) Unless otherwise specified, terms and definitions for ereliability and maintainability shall be in accordance with MIL-STD-778.

(e) The plan shall incorporate a selection of maintenance tasks to demonstrate MTTR and MPMT requirements. Evaluation of the achieved maintainability shall be performed in accordance with MIL-STD-471."

Page 35, paragraph 1-4.3: Delete the last sentence in this paragraph and substitute the following: To determine the number of type tests the total contract quantity of Types I (all classes), Type III and one-half of the ARTS III shall be summed and the resulting figure shall be used to enter the type test table of FAA-G-2100/1 section 1-4. For the purposes of any type test at least 3 transmitter/receiver pairs selected at random by the Government inspector of a test terminal configuration (Type I and II, or Type III and III or two ARTS III shall be subjected to the required type tests. In cases where main and standby options are installed, at least one transmitter/receiver pair of a test terminal configuration shall be subjected to testing of both channels. In cases where the multiple routing Type I terminals are tested, at least four (4) output circuits involving at least three transmitters shall be chosen at random for testing. All error rate tests performed under normal test conditions shall be at least 30 minutes long. Error rate tests conducted under service conditions shall be cumulitive from the beginning of each test day with error counts recorded at the times dictated by the environmental schedule of FAA-G-2100/1, section 1-4. For back to back error rate tests at least two (S + N)/N ratios shall be used such that the resultant error rates fall in the vicinity of 1 x 10-3 and 1 x 10-6 respectively.

Pages 36, 37 and 38 Table II and Table III: In the tabular headings, delete "One-Time-Tests" and substitute "Design Qualification Tests."

In Table II, add the following:

Test No.	Test	AC-Line Voltage	Part Paragraph	Design Qual. Tests	Type Tests	
" 4	External interface alarms, automatic mode Type I/TypeII or Type III/Type III	105-130V	1-3.4.5.13 3-3.3.8	—	X	"

In Table III, delete Test No. 3 and substitute the following:

Test No.	Test	AC-Line Voltage	Part Paragraph	Design Qual. Tests	Type Tests	Prod. Tests	
" 3	Status and alarm circuit interface	120V	1-3.4.5.13 1-3.4.5.13.1	—	—	X	"

Delete test 24(b) and add the following test to Table III:

Test No.	Test	AC-Line Voltage	Part Paragraph	Design Qual. Tests	Type Tests	Prod. Tests		
"25	Switched Networks	120V	1-4.3.7	--	X	--	"	#

Page 41, paragraph 1-4.3.6.1: Delete and substitute:

"1-4.3.6.1 Reliability and maintainability testing - Testing shall be performed at the contractor's factory to demonstrate the required system reliability and maintainability. This demonstration shall incorporate and integrate tests and measurements for MTTR, MPMT, MTBF and performance tests in accordance with the following:

(a) Testing shall be conducted under normal test conditions in accordance with the approved test plan (1-3.17.4), using three sets of prototype terminal equipment, or using additional sets if so provided in the contract schedule.

(b) Equipment shall be operated as a system (Fig. 1 or Fig. 2). Performance tests of bit error rates shall be conducted. The requirements for system bit error rates (1-3.14) shall be met during the system reliability demonstration. The specified bit error rate requirements shall be converted to the equivalent mean time between errors.

(c) Subject to the approval of the Government, the contractor shall select a test method(s) in Appendix B of MIL-STD-471 that is best

suited to the equipment design for demonstrating and evaluating selected MTTR and MTMT tests. The MTTR and MPMT requirements (1-3.6) shall be considered satisfied if and when the maintainability of equipment is demonstrated to a confidence level of at least 90 percent.

(d) To demonstrate system reliability, the equipment shall be operated continuously 24 hours/day, 7 days/week until the total system test time is accumulated in accordance with Table IV. An accept or reject decision for MTBF testing shall be in accordance with Table IV and shall be based on the required 2000-hour MTBF for a three-channel system (Fig. 1). The schedule for preventive maintenance during MTBF testing shall be the same as the maintenance procedures specified in the instruction book (1-3.17.8). Equipment on-line running time shall be distributed equally among the systems being tested.

Table IV
Accept/Reject Criteria Based on
Cumulative System Test Time

Total Failures Observed	Reject (Equal or Less)	Accept (Equal or More)
0	--------	4000 hrs.
1	--------	5600 hrs.
2	--------	7200 hrs.
3	2000 hrs.	8800 hrs.
4	4500 hrs.	10400 hrs.
5	7000 hrs.	12000 hrs.
6	9500 hrs.	12000 hrs.
7	12000 hrs.	----------

(e) Logs for all reliability and maintainability tests shall be prepared by the contractor and submitted as a part of the test plan (1-3.17.6).

(f) Equipment rejected for failure to achieve MTTR, MPMT, or MTBF shall require corrective action before retest to demonstrate compliance. Equipment shall be successfully tested in the factory prior to conducting on-site performance tests (1-3.17.7)."

Page 41, paragraph 1-4.3.6.1.1: In line 2, change "MIL-STD-829" to "MIL-STD-778."

Page 44, paragraph 1-4.3.6.1.2(b): Delete and substitute:

$$\text{MTTR} = \frac{\text{Downtime}}{\text{Number of relevant failures}}$$

Page 45, paragraph 1-4.3.6.2: At the end of line 2, add: "(1-3.3.1.1.5)."

Page 45, paragraph 1-4.3.6.2 - Renumber the paragraph to 1-4.3.7.

Page 45, paragraph 1-5.1: Delete the text and substitute the following: "The equipment shall be prepared for delivery in accordance with the requirements of Specification MIL-E-17555, level "C" packing.

Page 46, paragraph 1-6.2.2: Delete and substitute "Unused." #

Page 46, paragraph 1-6.2.3(c): Delete the text and substitute: "Proposed test methods, test data forms, and maintainability test plan to be submitted not less than 60 days prior to the contractor's schedule date for starting tests."

"Page 46, paragraph 1-6.2.6 Specification Amendment-4 - The contract schedule should specify the following:

(a) The proposed terminal equipment configuration data package (1-3.4.5.14) should be submitted to the Contracting Officer for review within 120 days after contract award.

(b) Proposed production test methods and test data forms should be submitted to the Contracting Officer for approval no less than 60 days prior to the contractor's scheduled date for starting production tests. (Modifies FAA-G-2100/1)."

Page 47, paragraph 2-1.1: In line 6 change "of" to "to".

Page 47, paragraph 2-3.1: Add the following sentence: When the transmitter is used in a Type Ia or Type III terminal the transmitter shall be equipped with either one or two output circuits depending on whether the M/S option is ordered in the contract schedule. For Type Ib and Ic terminals the transmitters shall be equipped with 2 or 4 and 3 or 6 output circuits respectively. #

Page 48, paragraph 2-3.2.1.2: Delete subparagraph "(e)" title, "Transient Response," plus the entire text, and, in their place, substitute:

"(e) Rise and Fall Times: Between 5% and 15% of the duration of the unit interval at 2400 BPS (measured between the 10% and 90% amplitude levels)."

Page 49, paragraph 2-3.2.1.3(c): In the first line, delete "6%" and substitute "15%".

Page 50, paragraph 2-3.3.2: Delete (a) and (b). In subparagraphs (c), delete "data/clock status" and "blue jewel" and substitute "Alarm" and "red jewel," respectively. In subparagraph (d), delete "Alarm bypass" and "pushbutton switch" and substitute "DC power ON-OFF" and "Toggle Switch" respectively. Add the following note after item (9): "At the option of the contractor, the D.C. power switch, item (d) above, may be located behind the front panel."

Page 50, paragraph 2-3.3.3.1: In the second line, change "50 ± 5%" to "50 ± 0.5%."

Page 51, paragraph 2-3.3.7: Delete the entire paragraph and substitute the following:

2-3.3.7 Output circuits - Each transmitter output circuit shall be capable of driving a 600 ohm 3002-C1 circuit at a send level of 0dBm. As so ordered in the contract schedule quantities of transmitters shall be produced to provide for driving 1, 2, 3, 4, or 6 600 ohm 3002-C1 circuits. In all cases the output characteristics shall meet the requirements of the following subparagraphs:

2-3.3.7.1 Output level - Each transmitter shall have one front panel output control that varies all channels simultaneously between the range of +3 to -20dBm. Each output channel shall be within 1dB of all other channels when terminated in 600r ± 5%. At the option of the contractor, card level trimmer adjustments on each individual channel may be used to meet the 1dB requirement of this subparagraph.

2-3.3.7.2 Channel isolation - The D.C. isolation between channels and from any channel output terminal to ground shall exceed 100K. Short circuiting or opening the termination of any channel shall not cause the level of any other channel to vary by more than ± 1dB.

Page 52, paragraph 2-3.3.8.1: In line 4, delete "... terminal 'alarm' monitor circuit..." and substitute: "...transmitter ECI alarm circuit...".

Page 52, paragraphs 2-3.3.9.1 and 2-3.3.9.2: Delete and substitute the following:

"2-3.3.9.1 Clock/data output and power input monitor - Whenever the data output level decreases below the fault/alarm threshold for a period of 1.0 second minimum, the alarm indicator (2-3.3.2c) shall light and the transmitter assembly ECI alarm (1-3.4.5.13) shall be set to the alarm ON state. When the level(s) has returned to within 3dB of nominal value, the alarm lamp and ECI alarm shall reset to their normal status. An alarm threshold control shall be provided for the data alarm monitor. The data output alarm threshold level shall be adjustable between 0dBm and -16dBm. Whenever the clock output level falls below the

alarm threshold the alarm lamp shall light and the ECI should set to the ON state. Whenever the clock output returns to a level exceeding the alarm threshold the alarm lamp shall go off and the ECI line shall set to the OFF state. The clock alarm threshold level shall be 4 volts ± 0.5 volt, referenced to signal ground. Clock signal output shall be inhibited whenever the data output level is in an alarm state or the test pattern switch is in the TEST position. The alarm indicator shall light when the TEST position is selected. In the event any one of the input DC voltage fails (e.g., open wire or blown fuse) the alarm lamp shall light and the ECI line shall set to ON. When the voltage returns to nominal the alarm lamp shall go out and the ECI line shall set to OFF. #

Page 52, paragraph 2-3.3.10: After the word "failure", in the first line, add, "(including failures resulting in a short circuit of any DC supply voltage)".

Page 53, paragraph 2-3.5: Delete the last sentence and substitute: "The ZERO bit at the start of the computer message synchronization character shall be preceded by a ONE bit in the idle character transmission."

Page 55, paragraph 3-3.1: At the end of the first sentence add the following: and capability for dual V.F. input circuits, dual equalizers and a transfer circuit for main and standby channel operation.

Change the third sentence to read: "Power for each group of three data receivers furnished in a Type II terminal shall be supplied from a separate power supply assembly (1-3.11).

Page 55, 3-3.2.1: Change the first line to read: "Each of the two receiver V.F. input interfaces shall be...".

Page 55, paragraph 3-3.2.2: In line 2, after "circuit", insert: "and parity signal input circuit." #

Page 56, paragraph 3-3.2.2.2(c): In the first line, delete "6%" and substitute "15%."

Page 56, add the following:

"3-3.2.2.4 Parity signal input circuit - The equipment shall include an input circuit for parity pulses transmitted to the receiver assembly from external equipment. The input interface characteristics shall be as follows. Equipment shall be designed to operate with either the RRDS or IFDS interface by strap option.

RRDS Interface

(a) Impedance: 1000 ± 50 ohms input, resistive

(b) Logic states and levels: Parity pulse ON (ONE state), ± 3.7 volts to + 6.24 volts drive requirement from external equipment -- 10 ma. or less.

Parity pulse OFF (ZERO state), not greater than ± 0.5 volts. Sink capability of external equipment is less than 2 ma.

(c) Parity pulse width: Pulse ON; 5.0 MS ± 5%

(d) Pulse rise and fall times: Between 20 and 60 usec

(e) Parity pulse PRF: Variable, 0 to 185 pps

(f) Minimum off-time: 417 usec

IFDS Interface

(a) Impedance: 6000 ohms minimum input, resistive

(b) Logic states and levels: Parity pulse ON (ONE state), not greater than + 0.5 volt to assume the correct logic state.

Parity pulse OFF (ZERO state), not greater than - 0.5 volts to assume the correct logic state.

(c) Sensitivity: Maximum operating current required to the input to correctly assume the ONE state shall not exceed 100 microamperes, while a ZERO state current of opposite but equal magnitude shall cause the input to correctly assume parity pulse OFF state. The current of the two states shall be within 10% of each other.

(d) Parity pulse width: 417 microseconds ± 5%.

(e) Pulse rise and fall times: Between 20 and 60 usec

(f) Parity pulse PRF: Variable, 0 to 270 pps"

Page 56, paragraph 3-3.3.2: Delete subparagraphs a, b, c, d, e, and f, and substitute the following:

" (a) Automatic/Manual Mode Select - Main/Standby Select — Two (2) toggle switches or one (1) rotary switch

(b) DC power "ON-OFF" — Toggle Switch

(c) Unused

" (d)

VF ALARM - Main Channel	-- Red Indicator
VF ALARM - Standby Channel	-- Red Indicator
ALARM	-- Red Indicator
PARITY ALARM - Main Channel	-- Red Indicator
PARITY ALARM - Standby Channel	- Red Indicator
AUTO MODE Select	-- Green Indicator
MANUAL MODE Select	-- Blue Indicator
MAIN Channel In-Use	-- Green Indicator
STANDBY Channel In-Use	-- Blue Indicator "

" (e) Unused

" (f) Unused

Add the following at the end of the paragraph: "In exception to FAA-G-2100/1, paragraph 1-3.14.5, small parts, required for conditioning of selected tests signals, may be mounted on the test selector switch. Status and alarm indications shall be on-line and indicate current status of circuits being monitored. Alarm indications shall not be subject to delay timer functions (3-3.3.8.1, 3-3.3.8.3). Location of front panel components shall be determined by the contractor. Layout drawings of the assembly shall be submitted to the Government for review. At the option of the contractor, the D.C. power switch, item (b) above, may be located behind the front panel."

Add the following subparagraph:

"3-3.3.2.1 Assembly functional controls - The following controls shall be mounted on the assembly, but not on the front panel:

	FUNCTION	COMPONENT
(a)	Reset	Pushbutton or spring loaded toggle switch
(b)	Normal/Test select operation	Toggle switch
(c)	Line signal equalization	Continously variable controls, with knobs."

Page 58, paragraph 3-3.3.4: In the second line, change "-40 DBM to +5 DBM" to "-30 DBM to 0 DBM", and in lines 4 and 7 respectively, change "25" to "20" and "-25" to "-20".

Page 58 paragraph 3-3.3.6 - Delete the first sentence and substitute the following: "an equalizer circuit shall be provided with each receiver to equalize the phase and amplitude distortion occurring on Type 3002-C1 leased lines. As called out in the contract schedule dual equalizer circuits shall be provided with those receivers outfitted for dual V.F. input capacity.

Page 58, paragraph 3-3.3.6.1: Delete the text and substitute the following: "Continuously variable equalizer controls shall be provided to permit optimum equipment adjustment to compensate for phase and amplitude distortion of line signals. Each control shall be provided with a knob and arbitrary scale markings on the mounting surface. Markings shall also identify control settings to be used when equipment is operated with dialed-up type of communication channels having average characteristics.

Page 59, delete paragraphs 3-3.3.8, 3-3.3.8.1, and 3-3.3.8.2 and substitute the following:

"3-3.3.8 Monitoring, fault-alarm and control-switching functions - Each receiver assembly shall be designed to perform the functions listed hereunder. All assemblies shall be furnished complete with the basic plug-in modules and associated circuitry for system operation, using a single data input circuit or MAIN channel. When specified in the contract schedule, the optional STANDBY channel plug-in modules (1-3.3) shall be furnished in the quantities specified. V.F. clock, parity and power monitor circuits and indications shall be supplied with both single channel and main/standby channel receivers. However, only the main/standby channel receivers shall be equipped with the switch-over circuits.

"3-3.3.8.1 VF input signal monitor - Separate plug-in modules shall be used to independently monitor the received VF signal level detected at the receiver main and standby channel input terminals. When the level on a channel decreases from the nominal value by 10 dB minimum, the associated VF front panel alarm indicator (3-3.3.3) shall light which results in activating a delay timer. When the timer decrements to zero delay, the VF alarm at the ECI shall be set to the alarm ON state (1-3.4.5.13) and the associated VF front panel alarm indicator shall set ON. This sequential action shall, in turn, enable control-switching logic and switch operation of the receiver input from the main to standby input channel. The monitor-alarm/delay timer cycle shall be repeated in the event a VF alarm is detected on the standby input circuit. Switching back to the main channel is not required should the main channel VF level subsequently return to a nonalarm level. However, when the VF level on the channel returns to within 5 dB of nominal, the VF - ECI alarm shall be reset to the alarm OFF state. Panel alarm indication having once been set as a result of the timer delay decrementing to zero, shall remain lighted until manually reset (3-3.3.8.4). However, if the VF alarm indicator is not set and the VF level on the channel returns to within 5dB of nominal, the alarm indicator shall go OFF without requiring a manual reset.

The delay timer shall be fixed at 2 seconds. The VF fault/alarm threshold level for each input channel shall be individually adjustable between -16 dBm and -30 dBm. Operation of the VF monitor shall be governed by other functional requirements specified in 3-3.3.8.6 hereunder.

"3-3.3.8.2 Clock output signal monitor - Circuitry shall be provided to monitor the clock output level. When the level decreases below 4 ± 0.5 volts, referenced to signal ground, the associated panel alarm indicator shall light and the ECI alarm (1-3.4.5.13) shall be set to the alarm ON state. The ECI alarm and indicator shall remain ON until the level rises above the alarm threshold. Other functional requirements governing clock monitor operation are specified in 3-3.3.8.5."

"3-3.3.8.3 Parity alarm monitor - Circuitry shall be provided to monitor the extent and duration of parity error signals crossing the RRDS and IFDS interfaces (3-3.2.2.4) to the data set receiver. The circuitry shall observe the parity signals in 0.5 ± 0.1 second time blocks and determine if the parity pulse count exceeded 10 during the observed time period. Whenever the parity exceeds 10 during a nominal 0.5 second interval the monitor circuit shall increment an up-down counter. If the parity count does not exceed 10, the monitor circuit shall store this fact and when 9 consecutive 0.5 second periods elapse without a count exceeding 10, the up-down counter shall be decremented by one. Decrementing of the up-down counter shall not take place if the counter reads zero (i.e., a negative count cannot occur in the up-down counter). In the event the up-down counter increments to a count of 5, the monitor circuitry shall set the parity alarm light, for the operating channel, ON and shall set the ECI line ON. Additionally, the monitor circuitry shall cause switchover and activation of the standby input channel of the receiver. After switching to the standby channel parity monitoring shall continue as described above.

In switching between channels the parity alarm circuits shall allow between 500 and 1000 ms of "dead" time whereby parity alarm signals from external equipment are ignored. At the conclusion of the "dead" time the parity alarm indicators and ECI shall function as described elsewhere in this paragraph. The function of the "dead" time is to allow time for the external equipment to establish message resynchronization after switching to the standby data channel. When the counter has been incremented to five the ECI parity alarm (1-3.4.5.13) shall be set to the alarm ON state and remain ON until manually reset. Panel alarm indication having once been set as a result of the parity alarm shall remain lighted until manually reset. Other functional requirements governing parity monitor operation are specified in 3-3.3.8.6."

"3-3.3.8.4 Reset switch - Activating the RESET switch (3-3.3.2) while in the manual mode shall clear all front panel alarm indications and ECI

alarms. In the event of a primary power failure upon restoration of power all monitoring, status and alarm circuits shall be automatically reset to normal; manual reset shall not be required. If the receiver is in "auto" mode, upon restoration of power, the receiver shall reset to MAIN channel operation all alarms cleared. If the receiver is in "manual" mode, upon restoration of power the receiver shall reset to whichever channel is selected, all alarms cleared.

"3-3.3.8.5 Test/Normal Switch - A switch (3-3.3.2.1) shall be provided for use during periods of preventive or corrective maintenance to override normal monitor, control and switching functions. When in the test position, the associated ECI alarm (1-3.4.5.13) and alarm lamp shall be set to the alarm ON state; however, all other ECI alarms shall be set to the alarm OFF state. The test/normal switch shall not affect normal operation of monitor circuits and associated front panel VF and parity alarm indications. The above requirements shall apply both to automatic and manual modes of operation."

"3-3.3.8.6 Manual-automatic mode select - A switch (3-3.3.2.1) shall permit selecting either Manual or Automatic as the normal mode of operation. The following functional requirements supplement other requirements in this specification.

"3-3.3.8.6.1 Manual mode -

(a) A strap option shall be provided to permit selecting operation with or without standby channel plug-in modules installed.

(b) When main and standby modules are installed, either the main or standby channel can be selected for normal operation. Channel switch-over functions shall be inhibited.

(c) When main and standby modules are installed, a VF or parity alarm detected on the off-line channel shall not be reported at the ECI. However, the alarm lamp indication shall not be suppressed.

(d) The RESET switch shall be functional only in the manual mode.

(e) When main and standby modules are installed, the MANUAL and selected channel IN-USE status lamps shall be lighted."

"3-3.3.8.6.2 Automatic mode -

(a) When initially switching from manual to automatic mode, the main channel input shall be activated as the on-line channel.

(b) Switching to the automatic mode shall be inhibited unless all monitor circuits are in a nonalarm state.

(c) Switching to the standby channel shall be inhibited if a VF alarm has been detected for that channel prior to switchover.

(d) A clock alarm shall inhibit the channel switching function.

(e) A VF alarm detected on the standby channel when in the off-line status shall be reported at the ECI.

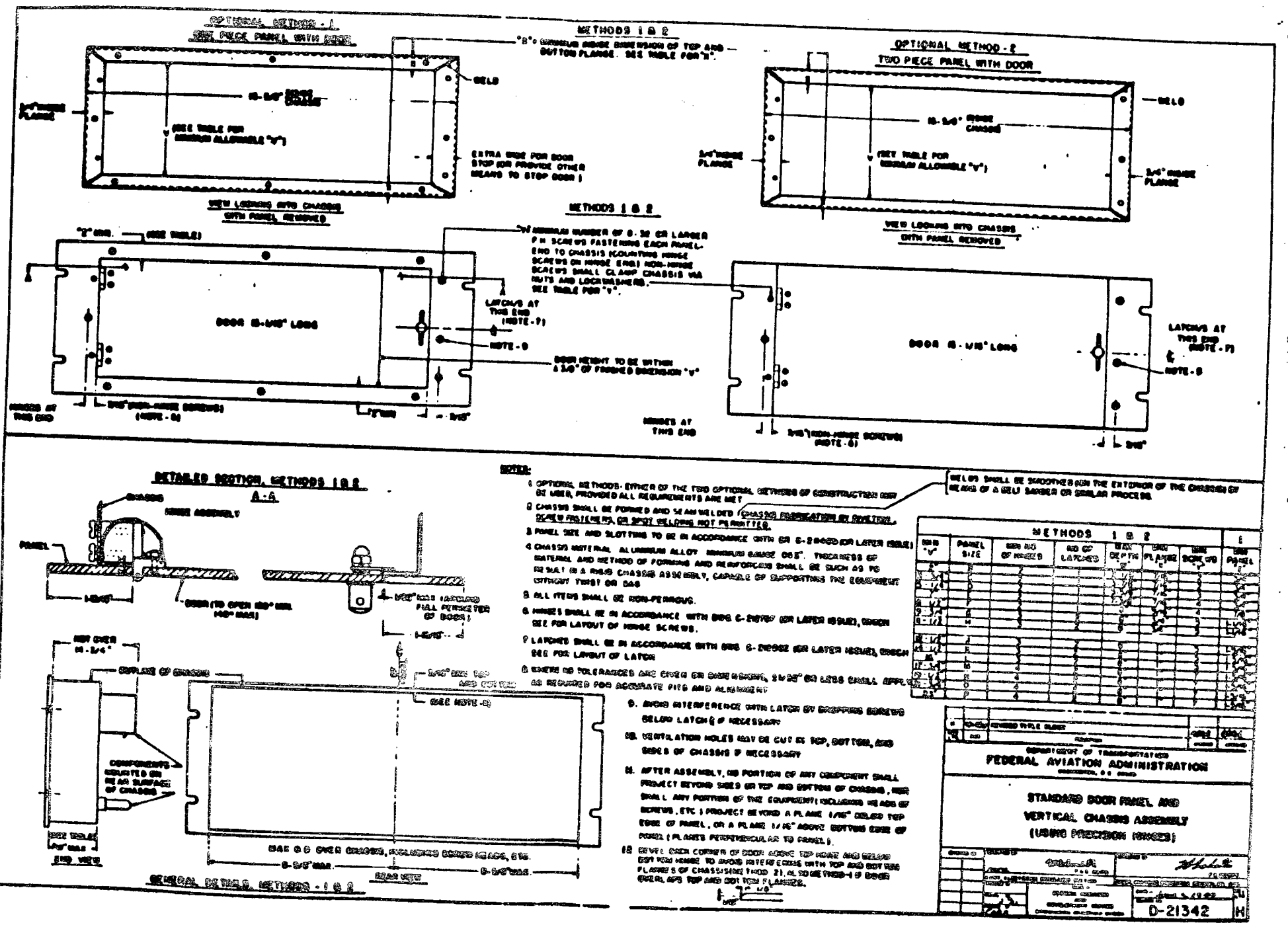
(f) Resetting the alarm, ECI and status indicators for automatic mode operation shall be done by first switching to a "Manual" mode, pushing the RESET button, then switching to "Automatic" mode.

(g) With the test/normal switch in the TEST position, the channel switching function shall be inhibited. #

Page 59, paragraph 3-3.3.9: After the word "failure" in the first line, add "(including failures resulting in a short circuit of any DC supply voltage)."

* * *

ATTACHMENT:
Drawing D-21342H



NOTES:

1. OPTIONAL METHODS - EITHER OF THE TWO OPTIONAL METHODS OF CONSTRUCTION MAY BE USED, PROVIDED ALL REQUIREMENTS ARE MET.
2. CHASSIS SHALL BE FORMED AND SEAM WELDED (CHASSIS FABRICATION BY RIVETING, SCREW FASTENERS, OR SPOT WELDING NOT PERMITTED).
3. PANEL SIZE AND SLOTTING TO BE IN ACCORDANCE WITH SPEC C-2 DASH (OR LATER ISSUE).
4. CHASSIS MATERIAL: ALUMINUM ALLOY MINIMUM GAUGE .063". THICKNESS OF MATERIAL AND METHOD OF FORMING AND REINFORCING SHALL BE SUCH AS TO BE SUITABLE FOR A RIGID CHASSIS ASSEMBLY, CAPABLE OF SUPPORTING THE EQUIPMENT WITHOUT TWIST OR SAG.
5. ALL ITEMS SHALL BE NON-FERROUS.
6. HINGES SHALL BE IN ACCORDANCE WITH SPEC C-2107D (OR LATER ISSUE), SEE SPEC FOR LAYOUT OF HINGE SCREWS.
7. LATCHES SHALL BE IN ACCORDANCE WITH SPEC C-2103D (OR LATER ISSUE), SEE SPEC FOR LAYOUT OF LATCH.
8. UNLESS NO TOLERANCES ARE GIVEN OR SHOWN, ±1/32" (0.) LESS SHALL APPLY AS REQUIRED FOR ACCURATE FIT AND ALIGNMENT.
9. AVOID INTERFERENCE WITH LATCH OR GROMMET SCREWS BELOW LATCH IF NECESSARY.
10. VENTILATION HOLES MAY BE CUT IN TOP, BOTTOM, AND SIDES OF CHASSIS IF NECESSARY.
11. AFTER ASSEMBLY, NO PORTION OF ANY COMPONENT SHALL PROJECT BEYOND SIDES OR TOP AND BOTTOM OF CHASSIS, NOR SHALL ANY PORTION OF THE EQUIPMENT (INCLUDING HEADS OF SCREWS, ETC.) PROJECT BEYOND A PLANE 1/16" BELOW TOP EDGE OF PANEL, OR A PLANE 1/16" ABOVE BOTTOM EDGE OF PANEL (PLANES PERPENDICULAR TO PANEL).
12. BEVEL EACH CORNER OF DOOR ABOVE TOP HINGE AND BELOW BOTTOM HINGE TO AVOID INTERFERENCE WITH TOP AND BOTTOM FLANGES OF CHASSIS (SEE METHOD 2). (OMIT BEVELS IF DOOR EXTENDS TOP AND BOTTOM FLANGES.)

WELDS SHALL BE SMOOTH FINISH ON THE EXTERIOR OF THE CHASSIS BY MEANS OF A BELT SANDER OR SIMILAR PROCESS.

METHODS 1 & 2								
SIZE "W"	PANEL SIZE	SIZE NO. OF HINGES	NO. OF LATCHES	HEIGHT "V"	DEPTH "B"	FLANGE "F"	SCREW SIZE "G"	SIZE PANEL "A"
A								
B								
C								
D								
E								
F								
G								
H								
J								
K								
L								
M								
N								
P								
R								
S								
T								
U								
V								
W								
X								
Y								
Z								

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

STANDARD DOOR PANEL AND VERTICAL CHASSIS ASSEMBLY (USING PRECISION HINGES)

D-21342 H